PATENT
Attorney Docket No.: 16869S-092200US
Client Ref. No.: W1141-01EQ

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

SHUJI FUJIMOTO

Application No.: 10/649,100

Filed: August 26, 2003

For: METHODS FOR CONTROLLING STORAGE DEVICES CONTROLLING APPARATUSES

Customer No.: 20350

Examiner: Unassigned

Technology Center/Art Unit: 2184

Confirmation No.: 4948

PETITION TO MAKE SPECIAL FOR NEW APPLICATION UNDER M.P.E.P. § 708.02, VIII & 37 C.F.R. § 1.102(d)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner is authorized to charge the petition fee of $130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

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(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicants will make an election without traverse as a prerequisite to the grant of special status.

(c) Pre-examination searches were made of U.S. issued patents, including a classification search and a key word search. The classification search was conducted on or around March 4, 2005 covering Class 709 (subclasses 212 and 213), Class 711 (subclasses 114, 130, 147, and 154), and Class 714 (subclass 7), by a professional search firm, Lacasse & Associates, LLC. The key word search was performed on the USPTO full-text database including published U.S. patent applications. The inventors further provided a reference considered most closely related to the subject matter of the present application (see reference #6 below), which was cited in the Information Disclosure Statement filed with the application on August 26, 2003.

(d) The following references, copies of which are attached herewith, are deemed most closely related to the subject matter encompassed by the claims:

(1) U.S. Patent No. 6,356,978 B1;

(2) U.S. Patent No. 6,408,400 B2;

(3) U.S. Patent No. 6,766,359 B1;

(4) U.S. Patent No. 6,801,983 B2;

(5) U.S. Patent Publication No. 2003/0018927 A1; and

(6) U.S. Patent No. 5,845,061.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to apparatus and method for controlling storage devices when failure occurs.

Independent claim 1 recites a storage device controller comprising channel control portions each including a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. A processing portion is configured to decide that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared volume which is a storage region logically set on physical storage regions provided by the storage devices and which can be accessed commonly by any other channel control portion belonging to the same group as the channel control portion updating the data.

Independent claim 2 recites a storage device controller comprising channel control portions each including a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. A processing portion is configured to decide that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared memory which is contained in the storage device controller and which can be accessed commonly by the channel control portions.

Independent claim 3 recites a storage device controller comprising channel control portions each including a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. A processing portion is configured to decide that data updated by each of the channel control portions and handed over at the time of the fail-over are sent to another channel control portion belonging to the same group as the channel control portion updating the data, through a network connecting the channel control portions to one another.

Independent claim 9 recites a control method for a storage device controller including channel control portions each having a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information

processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. The control method comprises deciding that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared volume which is a storage region logically set on physical storage regions provided by the storage devices and which can be accessed commonly by any other channel control portion belonging to the same group as the channel control portion updating the data.

Independent claim 10 recites a control method for a storage device controller including channel control portions each having a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. The control method comprises deciding that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared memory which is contained in the storage device controller and which can be accessed commonly by the channel control portions.

Independent claim 11 recites a control method for a storage device controller including channel control portions each having a circuit board on which a file access processing portion for receiving file-by-file data input/output requests sent from information processors and an I/O processor for outputting I/O requests corresponding to the data input/output requests to storage devices are formed, the channel control portions being classified into groups for the sake of fail-over. The control method comprises sending data updated by each of the channel control portions and handed over at the time of the fail-over to another channel control portion belonging to the same group as the channel control portion updating the data, through a network connecting the channel control portions to one another.

One of the benefits that may be derived is that a troublesome data handover process need not be carried out after failure occurs in a channel control portion, so that fail-over can be carried out speedily.

B. Discussion of the References

None of the references disclose channel control portions classified into groups for the sake of fail-over. For instance, independent claims 1 and 9 each recite classifying the channel control portions into groups for the sake of fail-over, and deciding that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared volume which is a storage region logically set on physical storage regions provided by the storage devices and which can be accessed commonly by any other channel control portion belonging to the same group as the channel control portion updating the data. Independent claims 2 and 10 each recite classifying the channel control portions into groups for the sake of fail-over, and deciding that data updated by each of the channel control portions and handed over at the time of the fail-over are stored in a shared memory which is contained in the storage device controller and which can be accessed commonly by the channel control portions. Independent claims 3 and 11 each recite classifying the channel control portions into groups for the sake of fail-over, and deciding that data updated by each of the channel control portions and handed over at the time of the fail-over are sent to another channel control portion belonging to the same group as the channel control portion updating the data, through a network connecting the channel control portions to one another.

1. U.S. Patent No. 6,356,978 B1

The patent to Kobayashi et al. (6,356,978 B1) assigned to Fujitsu Limited, provides for a File Control Device. Discussed is the pair of management modules (RMM) 17a and 17b, which appear to connect to channel adapters 104 and disk adapters 106. Each resource management module 17a and 17b appears to update the management information stored in its own common memory and simultaneously update the management information of the common memory provided in the other resource management module. Common memories 12a and 12b may be provided for storing management information tables to improve reliability. Control storages 14a and 14b may include fault detecting and load monitoring means. See Figure 1; column 4, lines 28-31, 40-43, and 63-67; and column 6, lines 27-31.

The reference does not disclose channel control portions or adapters classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

2. U.S. Patent No. 6,408,400 B2

The patent to Taketa et al. (6,408,400 B2), assigned to Fujitsu Ltd., provides for a Disk Array Device. Shown in Figure 26 are two storage array controllers, which appear to also be connected to a shared memory device 34. Even if write processing is not finished in normal state due to power failure of a system, the data may be easily revived using the data and management and information stored in non volatile memory 34 of shared device 90. See column 29, lines 21-27; and column 32, lines 18-24.

The reference does not disclose channel control portions classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

3. U.S. Patent No. 6,766,359 B1

The patent to Oliveira et al. (6,766,359 B1), assigned to EMC Corp., provides for a Method and Apparatus for Utilizing Multiple Paths in a File Transfer Utility Employing an Intermediate Data Storage System. Discussed is a group of channel adapters 30 and channel directors 32, which may provide interfaces through which host processors 12 may connect to data storage system 14. Channel director 32 appears to contain a microprocessor that processes commands and data from host processors 12 and also appears to handle I/O requests from host processors 12. Data storage system 14 may contain a shared memory 15 that appears to be accessible to at least two of the host processors connected to the system. The control structures and transfer buffers that are stored in the shared memory appear to provide a mechanism by which one host processor can transfer files to and/or receive files from another host processor that is connected to the data storage system. See Figure 2; column 5, lines 52-58; and column 6, lines 31-33.

The reference does not disclose channel control portions or adapters classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

4. U.S. Patent No. 6,801,983 B2

The patent to Abe et al. (6,801,983 B2), assigned to Hitachi, Ltd., provides for a Disk Control Device and Storage Device IT. Discussed are a plural number of clusters, which may include channel controllers, and may be equipped with resources and a communication system common to each cluster. A common memory may be accessed from

each cluster and across clusters making possible communications between modules across clusters. See column 7, lines 24-29.

The reference does not disclose channel control portions classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

5. U.S. Patent Publication No. 2003/0018927 A1

The patent application publication to Gadir et al. (2003/0018927 A1) provides for a High-Availability Cluster Virtual Server System. Discussed is a high-availability server, which appears to have a cluster of nodes. Shared disk 124 may be accessible to all nodes and it may contain status and configuration data. Nodes may detect failure of other nodes upon cessation of receiving of heartbeat messages. If one of the notes or one of its components fails, fail-over may occur, and the virtual server of the failed node may be migrated to another mode. See Figure 1; and paragraphs [0011], [0012], [0029], and [0035].

The reference does not disclose channel control portions classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

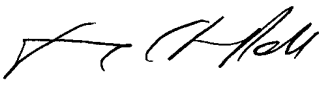
6. U.S. Patent No. 5,845,061

This patent to Miyamoto et al. (5,845,061) provides for a Redundant Client Server System. Disclosed is a client server system which has clients, a server of execution system, and a server of fault auxiliary system are connected. A process administrator is provided in each one of the server of execution system and the server of fault auxiliary system. When a fault has occurred in a disk processor 109 in the server 101 of execution system, the process administrator 108 in the server of execution system transmits only "requests" relating to the disk processor among "requests" received from clients to the server of fault auxiliary system. A process administrator 110 in the server of fault auxiliary system 102 conducts corresponding server processing on the "requests" transmitted from the server of execution system.

The reference does not disclose channel control portions classified into groups for the sake of fail-over, as recited in independent claims 1, 2, 3, 9, 10, and 11.

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



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